



Real world CO₂ emissions

causes and effects

10th May 2012, lowCVP conference, London

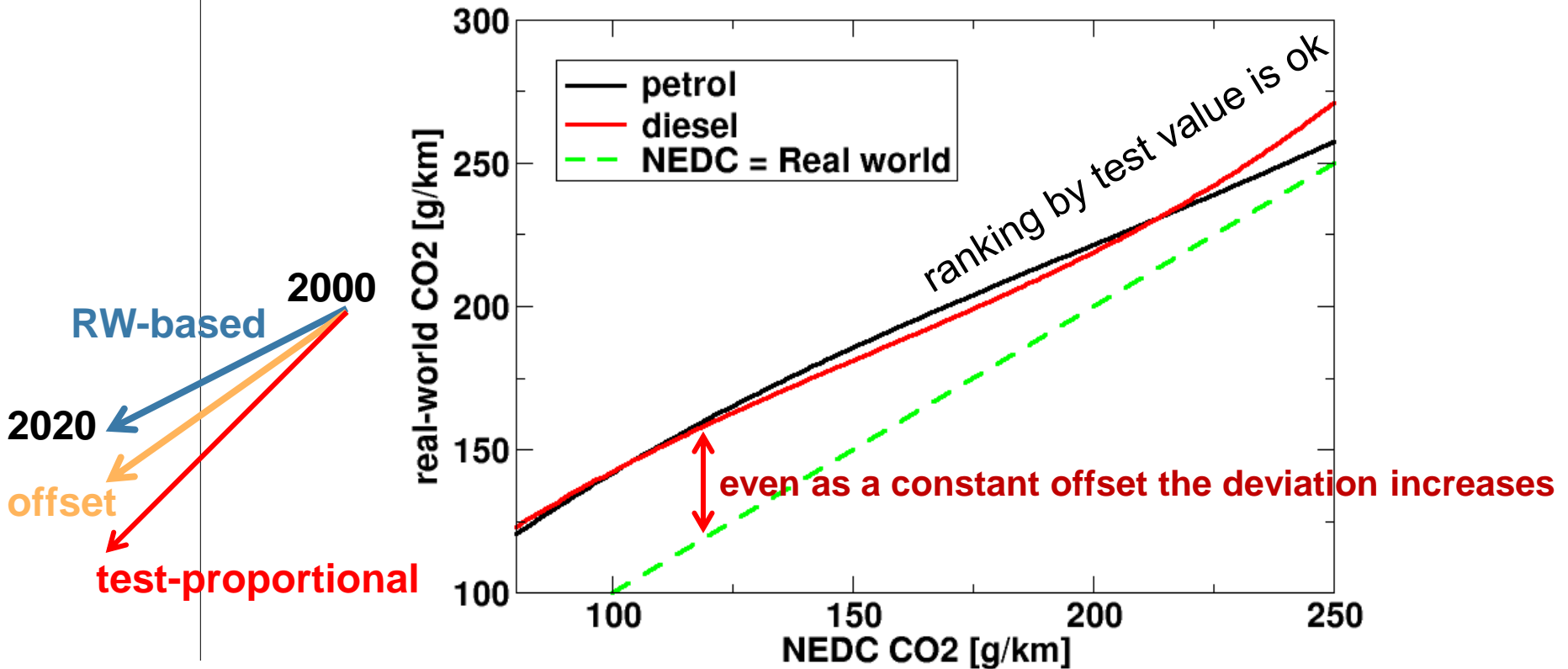
Dr. Norbert E. Ligterink
Sustainable Transport and Logistics Group, Delft, The Netherlands

norbert.ligterink@tno.nl





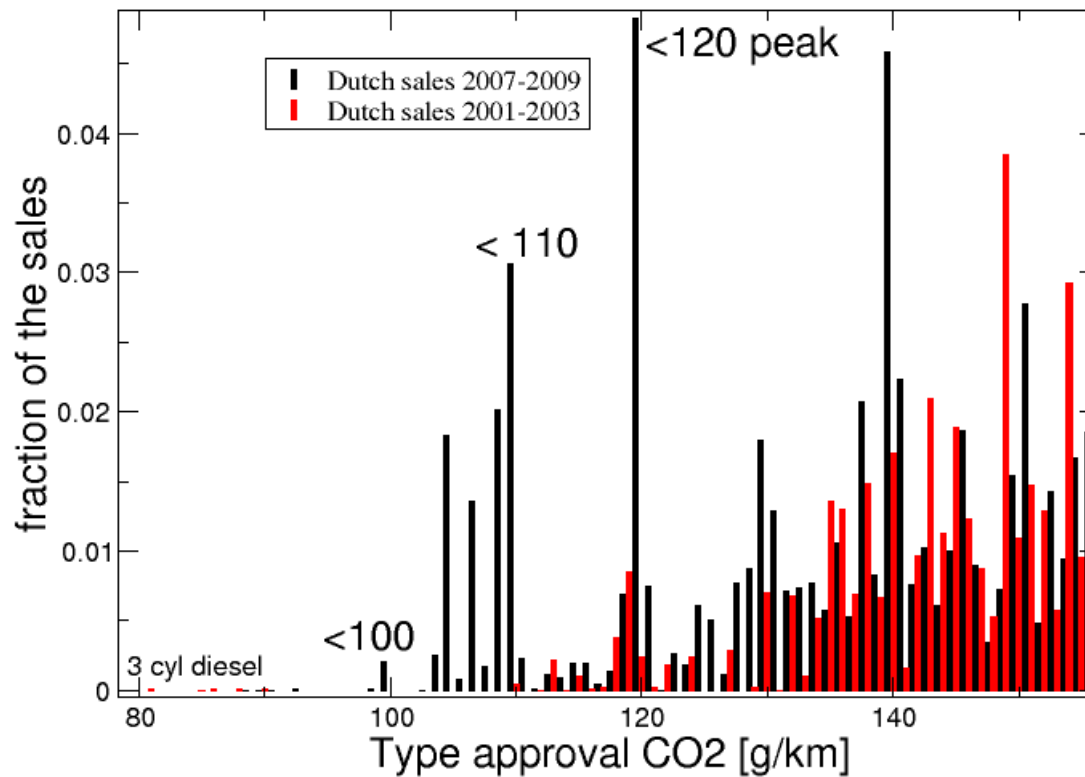
increasing deviation with decreasing type-approval value
whatever way you look at it



200 000+ vehicles from Travelcard (2009-2012) study



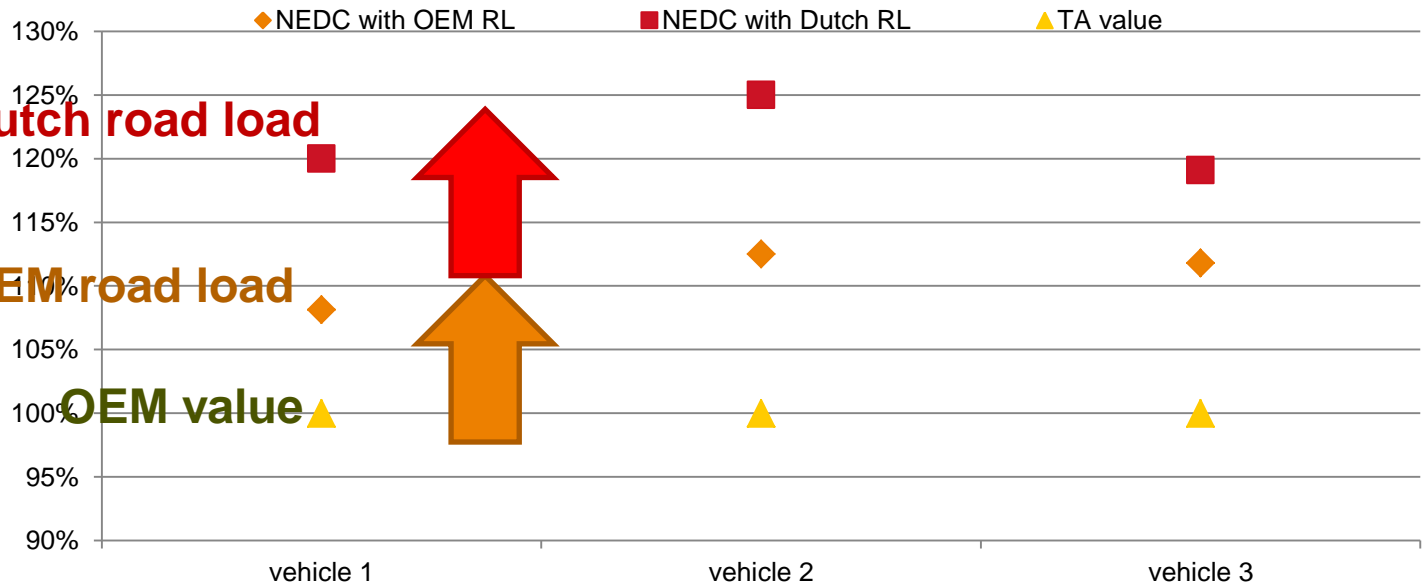
“just below” values started around 2005 *tuning at least 10 g/km*





Factory “record” value ~20% below “neutral testing” *investigations are on going ...*

Deviation of CO2 emission for NEDC tests with OEM spec- and Dutch Road Load setting (100% = TA value)



neutral test with Dutch road load

neutral test with OEM road load

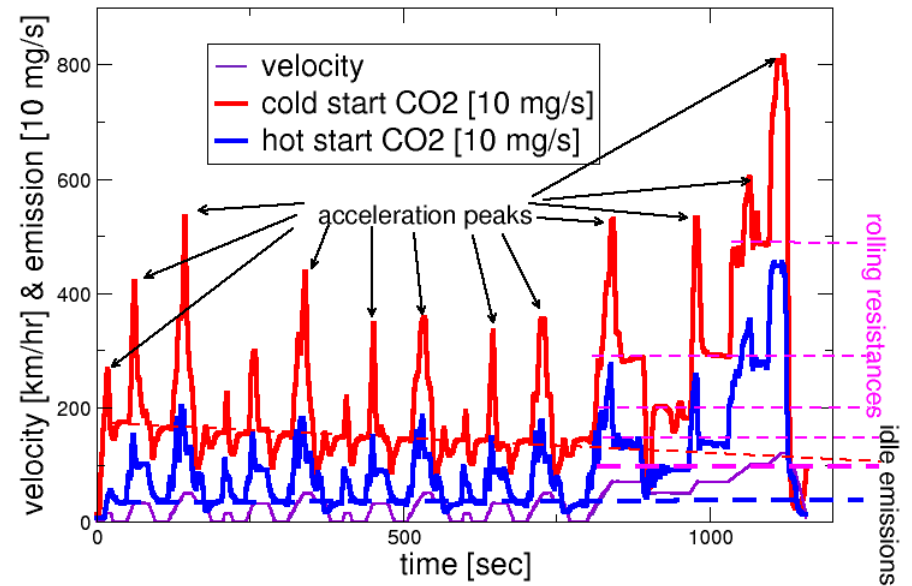
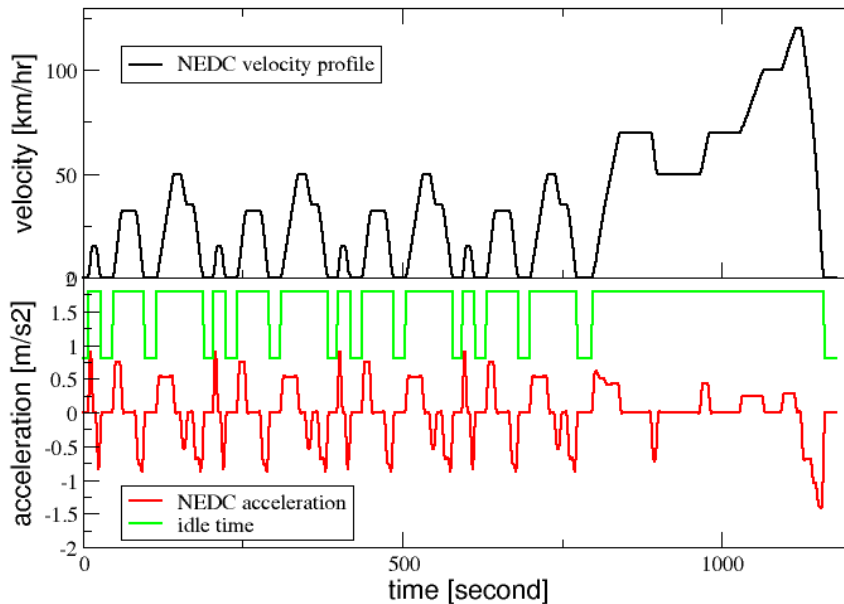
OEM value



NEDC: low acceleration, low velocity, many stops

cold start, idle and low engine load dominated in the test

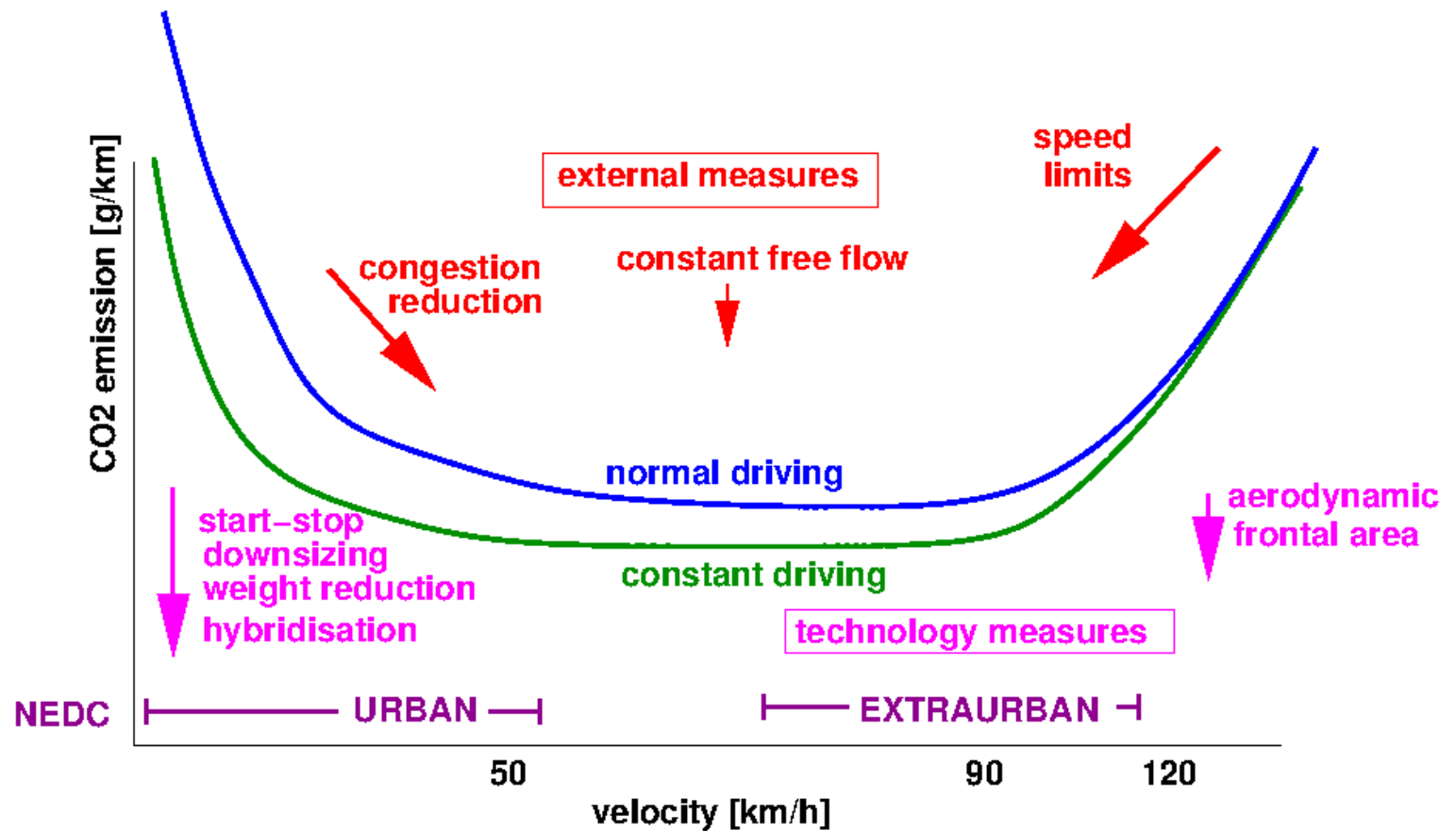
NEDC driving cycle properties



NEDC test result and hot test

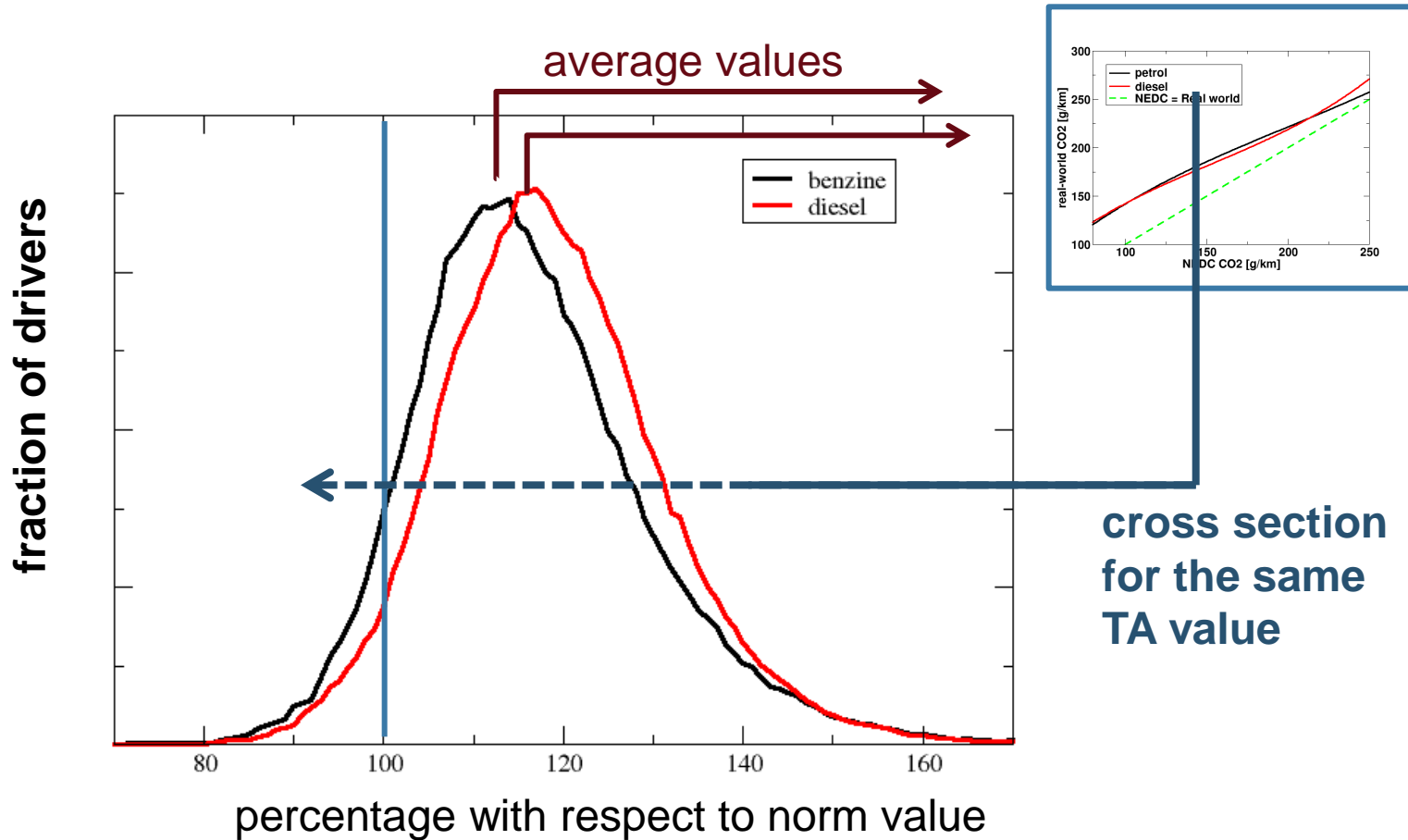


the CO₂ bath tub



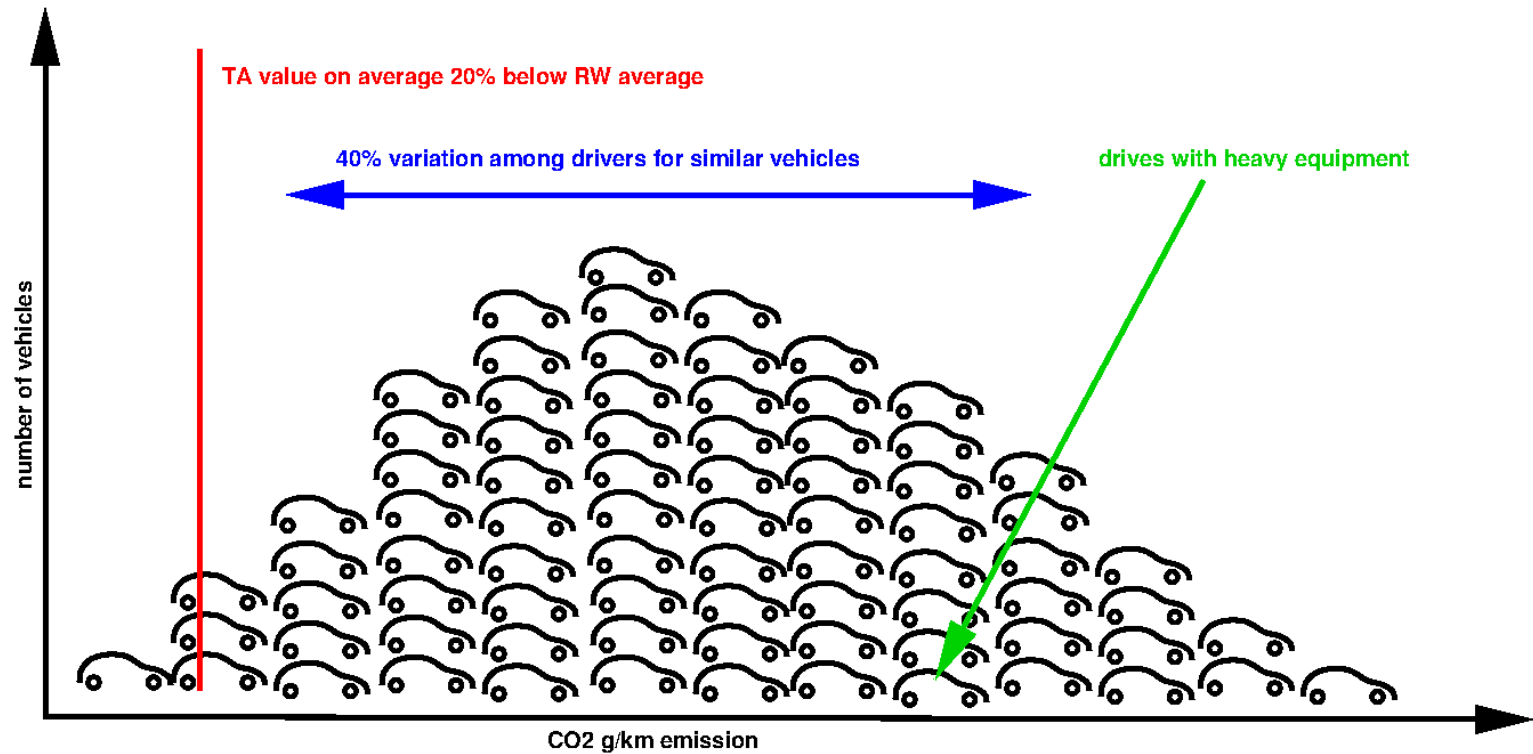


Same type-approval test value; *a large variation among different drivers*





same vehicle, different fuel consumption leading effect, but largely unexplained





real-world fuel-consumption

type-approval + usage + mileage + roads + congestion + age

- “*record type-approval*” testing is *worrisome*
 - limited information of realistic fuel consumption, only *ranking*
 - real-world *pollutants* emission likely much higher (especially NO_x)
 - old problem, but *impact* is increasing
- *increasing* deviation real-world and type approval fuel consumption
 - Travelcard study conclusive and consistent, with limited bias
 - 20% (range 0%-40%) findings in other studies (tests + monitoring)
- focus on *different aspects of driving*, as seen on the road, in tests
 - NEDC *focus* of low load and velocity, cold start, and idle
 - a few tests (WLTP) with a single value will not cover the *variation*
- correct fuel consumption for particular usage is a *shared responsibility*

Thank you for your attention

